## I Claim:



1. A method for analyzing a gas sample, comprising:

providing a gas sample or converting a sample to a gas sample;

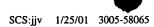
increasing pressure applied to the gas sample to compress the sample to a smaller

volume and provide a pneumatically focused gas sample; and

analyzing the pneumatically focused gas sample.

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- 2. The method according to claim 1 where the gas sample is pneumatically focused concurrently with or just prior to reaching a separatory column.
- 3. The method according to claim 1 where the gas sample is pneumatically focused concurrently with or just prior to reaching a spectrometric cell.
- 4. The method according to claim 1 where the gas sample is an air sample
  - 5. The method according to claim 1 where the gas sample is a breath sample.
- 6. The method according to claim 1 where providing a gas sample comprises continuously providing an air sample for pollution analysis.
  - 7. The method according to claim 1 where providing a gas sample comprises continuously providing a breath sample for analysis.
  - 8. The method according to claim 1 where increasing the pressure to pneumatically focus the gas sample comprises increasing the pressure of the sample to a pressure of from about 100 psi to about 15,000 psi.
- 9. The method according to claim 8 where the sample is analyzed using an optical waveguide.



- 10. The method according to claim 1 where increasing the pressure to pneumatically focus the gas sample comprises increasing the pressure of the sample to a pressure of from about 200 psi to about 2,000 psi.
- 5 11. The method according to claim 1 where increasing the pressure to pneumatically focus the gas sample comprises increasing the pressure of the sample to a pressure of from about 300 psi to about 700 psi.
- 12. The method according to claim 1 where increasing the pressure to
  10 pneumatically focus the gas sample is accomplished using a gas selected from the group
  consisting of hydrogen, helium, nitrogen, argon, carbon dioxide, air, or mixtures thereof.
  - 13. The method according to claim 1 where increasing the pressure to pneumatically focus the gas sample is accomplished using a focusing-carrier gas containing an internal standard.
  - 14. The method according to claim 1 where methane in the sample is used as an internal standard.
    - 15. The method according to claim 12 where at least one gas is supercritical.
  - 16. The method according to claim 15 where carbon dioxide or argon is supercritical.
  - 17. The method according to claim 1 where analyzing the pneumatically focused sample comprises reducing the pressure of the carrier-pneumatic focusing gas simultaneously with or subsequent to a pneumatically focused sample being injected onto a separatory column or a spectrometric cell.
- 30 18. The method according to claim 1 where the gas sample is pneumatically focused using a carrier gas or a compressor at a first pressure and further comprising rapidly

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decreasing or increasing pressure between a first and second pressure.

- 19. The method according to claim 18 where the first pressure is changed to the second pressure simultaneously with or subsequent to the sample being introduced to a spectrometric cell.
- 20. The method according to claim 17 where the pressure is reduced to 100 psi or less.
- 21. The method according to claim 1 where analyzing the pneumatically focused sample comprises cooling a head portion of the column prior to injecting the pneumatically focused sample onto the column.
- 22. The method according to claim 1 where analyzing the pneumatically focused sample comprises heating the column subsequent to injecting the pneumatically focused sample onto the column.
- 23 The method according to claim 1 where analyzing the pneumatically focused sample includes eluting a pneumatically focused sample with a first carrier gas, and then eluting the column with a second carrier gas.
- 24. The method according to claim 1 where analyzing the pneumatically focused sample comprises reducing the focusing pressure to a lower valve and then a supercritical fluid is introduced gradually to replace an initial carrier gas used to pneumatically focus the sample.
- 25. The method according to claim 23 where either the first or second gas is supercritical.
- 26. The method according to claim 23 where compositions of the first and second gases are changed continuously or discontinuously using gradient elution.

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- 27. The method according to claim 23 where pressures of the first and second gases are changed continuously or discontinuously using gradient elution.
- 28. The method according to claim 1 and further comprising continuously analyzing pneumatically focused samples.
- The method according to claim 1 and further comprising averaging individual 29. chromatograms of pneumatically focused samples.
- The method according to claim 29 where peak locations determined from the average are used to integrate peak areas in individual chromatograms contributing to the average.
- The method according to claim 1 where analytes from the pneumatically 31. focused sample are determined by a detector selected from the group consisting of FID, IR, FTIR, NDIR, ECD, TCD, NPO, FPØ, UV/Visible detectors, and combinations thereof.
- The method according to claim 1 where the pneumatically focused sample is 32. rallel or senally injected onto plural parallel or serial separatory columns.
- 33. The method according to claim 32 where the pneumatically focused sample is analyzed by 2 dimensional chromatography.
- 34. The method according to claim 32 where the pneumatically focused sample is analyzed by comprehensive chromatography.
  - 35. An automated method according to claim 1.
  - The method according to claim 35 where the method is computer controlled. 36.
  - A method for analyzing an air-sample, comprising:

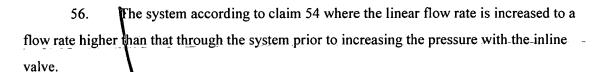
collecting an air sample;

increasing the pressure of the sample to a pressure of from about 100 psi to about 15,000 psi to preumatically focus the air sample; and

analyzing the pneumatically focused sample in real time using a gas chromatograph or a spectrometer.

- 38. The method according to claim 37 where the air sample is collected continuously into an averaging volume.
- 10 39. The method according to claim 37 and further including cryofocusing the air sample either prior to or subsequent to pneumatically focusing the sample.
  - 40. The method according to claim 37 and further including reduced temperature focusing the air sample either prior to or subsequent to pneumatically focusing the sample.
  - 41. The method according to claim 40 where reduced temperature focusing occurs on a separatory column.
- 42. The method according to claim 40 where reduced temperature focusing is accomplished using a device upstream of a separatory column.
  - 43. The method according to claim 40 where reduced temperature focusing occurs in a spectrometric cell.
- 25 44. The method according to claim 40 where reduced temperature focusing is accomplished using a device upstream of a spectrometric cell.
  - 45. An automated, remotely operated method according to claim 37.
- 30 46. The method according to claim I where the air sample comprises a breath sample.

- 47. The method according to claim 1 where portions of the pneumatically focused sample are fed to separate columns upstream of separate, plural detectors.
  - 48. The method according to claim 47 where the detectors are connected in series.
- 49. The method according to claim 47 where the plural detectors are connected in parallel.
- The method according to claim 1 where the pneumatically focused sample is fed to plural separatory columns.
  - 51. The method according to claim 50 where the separatory columns are connected in series.
  - 52. The method according to claim 50 where the separatory columns are connected in parallel.
  - 53. The method according to claim 50 where analytes are pneumatically focused during transit between or among columns.
  - A gas chromatograph and gaseous sample analysis system, comprising:
    a sample loop for receiving a first volume of a gaseous sample;
    a separatory column fluidly connected to and downstream of the sample loop;
    an inline pressure-increasing valve downstream of the separatory column which increases system pressure to pneumatically focus the gaseous sample and reduces flow rate through the system; and
  - a detector downstream or upstream of the pressure increasing valve for detecting analytes.
- The system according to claim 54 where the linear flow rate is reduced to be lower than that through the system prior to increasing the pressure with the inline valve.



- 5 57. The system according to claim 54 where the linear flow rate is reduced to a flow rate that is substantially the same as that through the system prior to increasing the pressure with the inline valve.
- The system according to claim 54 where the sample coil has a first volume which provides a sufficient sample amount to allow adequate analyte sensitivity once a sample is pneumatically focused, and wherein the sample amount can be equal to less than or equal to the first amount.
  - 59. The system according to claim 54 including plural separatory columns.
  - 60. The system according to claim 54 including plural detectors.
  - 61. The system according to claim 54 and including a vacuum pump to draw a gas sample through the column.
  - 62. The system according to claim 54 and further is comprising plural separatory columns.
- 63. The system according to claim 54 and further comprising plural sample collection coils and plural separatory columns.
  - 64. The system according to claim 54 and further including a sample collection pump for drawing the gaseous sample into the gas sample collection coil.
- 30 65. The system according to claim 54 and further including a computer for controlling the system.

- 66. The system according to claim 54 where the computer is operated by a neural network and expert systems.
- The system according to claim 54 where the gas chromatograph is located on a microchip.
  - 68. The method according to claim 1 where a pneumatically focused sample is sent directly to a detector without first being injected onto a separatory column.

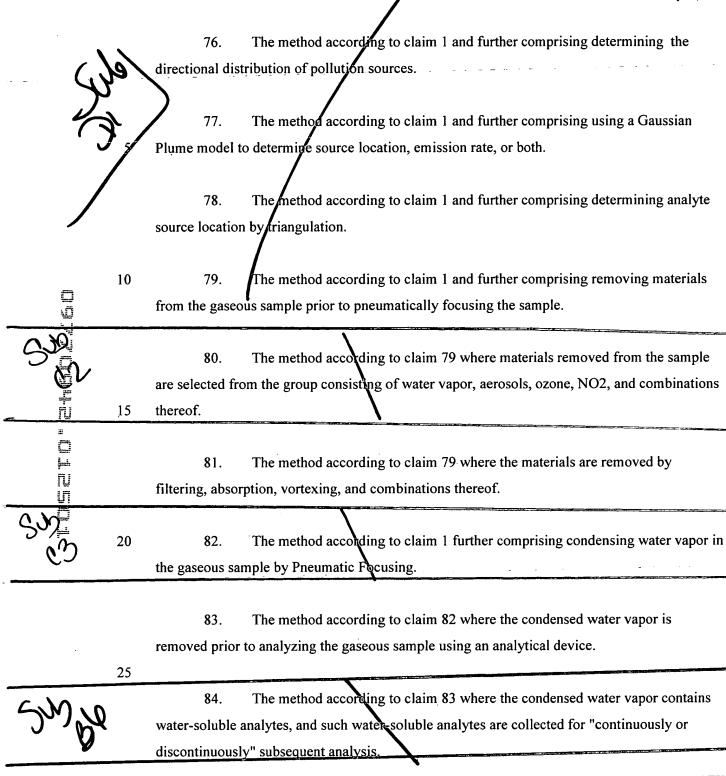
- 69. The method according to claim 1 where the gas sample is provided by a gas canister having a pre-stored gaseous sample.
- 70. The method according to claim 1 where the air sample includes a material selected from the group of air toxics, VOCs, OVOCs, metabolites, anesthetics, and combinations thereof.

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- 71. The method according to claim 1 where the gas sample is collected at a boundary of a site for fence-line monitoring of analytes.
- 72. The method according to claim 1 where providing the gaseous sample comprises providing the sample to a column within a period of less-than one minute.
- a period of less than about 1/sec
- 73. The method according to claim 73 and providing the sample to a column within a period of less than about 1/second.
  - 74. The method according to claim 55 and providing the sample to a column within a period of less than about 1 millisecond.
  - 75. The method according to claim 1 where the gas sample is an exhalation from a respiratory organism.

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operating the system.



The system according to claim 51 including a computer for continuously

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- 86. The method according to claim 1 where the liquid is water.
- 87. The method according to claim 13 where methane is added to the focusing-carrier gas.

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88. The method according to claim 39 where the air sample is cryogenically liquified.

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89. The method according to claim 1 where the pneumatically focused sample is separated into aqueous and gaseous components which are separately analyzed.

90. The method according to claim 1 where the pneumatically focused sample is subsequently cryogenically liquefied.

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91. The method according to claim 1 wherein pneumatic focusing is used to make eddy correlation measurements to quantify fluxes.

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